

# A collaborative approach based on short time scales to drive participatory design in the classroom

Juan C. Wendeus

MSc. Student Interaction Design

Chalmers University of Technology

Gothenburg, Sweden

[info@wendeus.com](mailto:info@wendeus.com)

Emilio G. Bahl

MSc. Student Interaction Design

Chalmers University of Technology

Gothenburg, Sweden

[bahl@student.chalmers.se](mailto:bahl@student.chalmers.se)

## ABSTRACT

Ideally, Interaction Design courses should stimulate collaborative and dynamic environments for students. Despite of this, students constantly face a lack of tools to create an appropriate participative environment to exploit new methods, techniques and ideas while they are in the classroom. This project explores a student's environment in order to find valuable means to drive participatory design in the classroom. To achieve this, a research was carried among the students and teachers of the Interaction Design program at Chalmers University where they have participated as part of a collaborative design process.

The aim of this paper is to present the actual problematic of students and teachers during class time, understand and classify their needs and use the results of this research to develop an application that empower the interactions and participation in the classroom.

## Categories and Subject Descriptors

H.5.2 [User Interfaces]: Miscellaneous

D.2.2. [Design Tools and Techniques]: User Interfaces

## General Terms

Participatory Design, Interaction Design

## Keywords

*Participatory Design, Collaborative learning, Interaction Design Methods, Time scales, Collaborative cloud, Contextual design.*

## 1. INTRODUCTION

Design is a human activity in which we conceive plans for the creation of artifacts that aim to have value for a prospective user of the artifact, to assist the user in his effort to attain certain goals (Dorst & van Overveld, 2009). The basis of Participatory Design (PD) is to include the people involved in the creation and conceptualization throughout the design stage of a product or service.

During the creative process, collaboration is constantly wanted; nowadays Students and Teachers are facing communication issues mainly because of the lack of possibilities to be constantly interconnected, besides of the presence of both in the classroom (Assiter, 2008). This creates a problem not only in the teacher-student relationship but also in the student-student situation.

For that reason, a conceptual project is proposed to explore those communication deficiencies between teachers and students. Taking advantage of the students of Interaction Design at Chalmers University of Technology to have them as testers and to look for clues to better understand how the communication

problem can be improved and if possible, propose a novel tool to help in this matter.

Participatory Design is successful method and the key of its implementation lies in the decision of which participants should be involved and which ones should not (Vink et al., 2008) Also, PD is considered a maturing area of research that is evolving among design professionals (Kensing, 1998). In order to achieve the project goals and considering the context and initial assumptions of the problem it was clear that a participatory design approach was the most appropriate.

## 2. APPROACH

Even if there is not a clear guideline to define where designers involve better into a participatory design process, designers play a very important role both in an early stage of an idea generating and during the prototyping stage (Vink et al., 2008).

For this reason, a research guideline was developed making focus in the tools that the students and teachers actually use and the time they usually spend on them. The following techniques to collect information were used:

- Individual interviews
- Semi-structured surveys for students and teachers with scenario based questions
- Expert interviews

### 2.1. INTERVIEWS

This project started by performing individual interviews where the students were asked what they think about the interaction design program's website, which is usually the main communication channel between students and teachers<sup>1</sup>. These interviews were conducted in an informal way but they were very significant in order to gather opinions about the actual problematic. The results helped as foundations to build semi-structured surveys.

### 2.2. SURVEYS

In these surveys, students were asked about their thoughts of the program's website, which is usually the main communication channel between students and teachers. These surveys threw different results that helped to comprehend the situation better.

Also in the surveys, students were asked about the use of the current

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<sup>1</sup> Interaction Design Chalmers University Website: <http://www.ixdcth.se>

platform and the time that they spent on it, looking for information and interacting with the teachers. Additionally, the students were asked about other available platforms that allow the use of mobile phones to interact with the content with courses and lectures. They were also asked to suggest different services or communication channels that they consider could work in this context.

During this process both students and teachers expressed that there were certain latencies between the messages transferred from teachers to students. These issues were all related to time scales and it was during this stage where the term of “temporality” arose. A better understanding of the time scales became crucial to understand why the development of the right time scales play a big role to deliver better interactions.

During the research, the data was processed, synthesized and interpreted using different techniques like *Affinity diagrams*, *KJ method* and *simple prioritization matrix*. During the process of analyses of gathering the data was useful to test these techniques and complement them in order to understand which technique matched better project’s ambition.

### 2.3. IDEATION

The application developed focused on the concept of temporality. This provided an environment where was possible to test different levels of interaction and to create a connection participation among the people.

The first design approach was to design an application with common interfaces for students and teachers. Breaking with the approach of other applications like Ping-Pong, that are based on a Teacher-Centric design. The structure of the application and its functionality was made with data extracted from interviews and surveys. The original functionality included not only the sharing content of the “interactive class” but also an enhanced messaging service, course information and cloud connected services to deliver hand-ins or retrieve reading material. In the conceptual level it worked well but became an enormous challenge to develop because of the complex infrastructure required and the vast diversity of devices that could potentially use the platform. Therefore, an approach focusing on the most used devices in class became a more practical way to solve this issue (figure 2).

The first iteration of the prototype started with a paper based model to explain the concept and the connectivity thought to make possible the interaction between teacher and students.

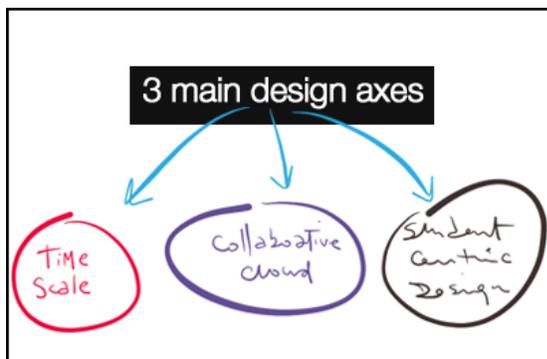


Figure 1 – Design Axes

The next iteration continued with a prototype based on an HTML5/CSS3/. The application was divided in two different interfaces. The first one it was a web application improved for iOS 6 and to be accessed from an iPhone<sup>2</sup> and the second one was a presentation layer<sup>3</sup> to be used for the teacher during a lecture. There, the students can transfer content from their mobile phones to share into this part of the system. Creating an interesting source for discussions among the people involved in a lecture. This participatory approach makes use of three design axes proposed that are going to be detailed later (See Figure 1).

### 3. DESIGN PROCESS

The design plan was based on our experience as students and the heuristic knowledge we had about the specific problem. First we started with an assumption-based hypothesis; additionally to this, we performed a series of research methods in order to affirm our presumptions and acquire new points of view and solutions for the design problem.

A design process was divided in four main stages; research and analysis, Ideation, design and implementation. During the Ideation and Design stages the main tools and techniques used were:

- Brainstorming
- Paper prototyping
- Wire framing
- High-end mockups
- Semi functional mockups

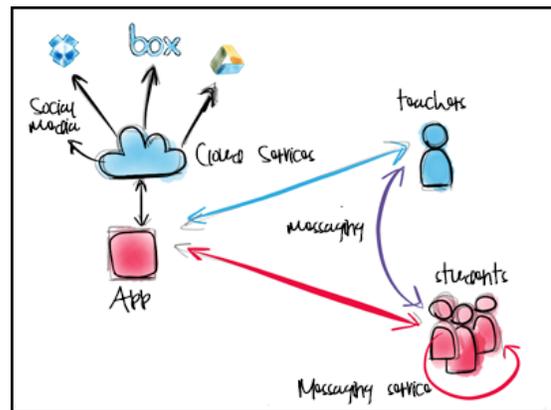


Figure 2 – Schematic of Application Functionality

#### 3.1. THE INTERFACE

The application is divided in two stages, the first one is the interface that sends information into the presentation layer (Mobile Application loader) and the second is a presentation layer (Screen Presentation Layer) that could be use in joint with a presentation tool like *Microsoft PowerPoint* or *Apple Keynote*.

The idea is to simplify and encourage the participation process among the students, letting them to be focused into the participation design process instead of the control and manipulation of the application. The interactions are simplified with the minimum of steps possible and with the inclusion of

<sup>2</sup> Application Loader: <http://applayer.synchronacy.com/>

<sup>3</sup> Presentation Layer: <http://presentation.synchronacy.com/>

gestures to make it more natural and understandable for the users (See Figure 3).

The presentation layer shows a simple board with “Polaroids” which represents the different contributions done by the students. These contributions are identified with a time-stamp of the creation with the aim of do not create some kind of favoritisms for ones more than others (See Figure 4). This Interface is run by the teacher, who has control of the lecture and works as a moderator of the design process.

Once in the sharing module, to interact the students have to choose an image from his/her device or from a website to then upload it into the system and send it to the presentation by swiping the image in the mobile phone. In approximately two seconds the image appears in the “polaroid” collection. There, they can be manipulated and rearranged by the teacher (See Figure 5). Finally, at the end of the session, a screen capture with the latest arrangement can be taken (See Figure 6).



Figure 3 – Mobile application and the loader:  
<http://apploader.synchronacy.com/>

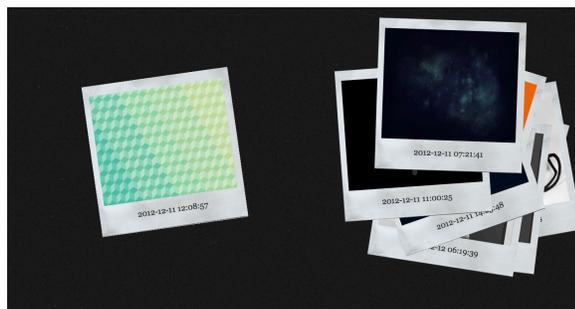


Figure 4 – Screen Presentation Layer:  
<http://presentation.synchronacy.com/>

## 4. RESULTS AND DISCUSSION

The results obtained from the research were satisfying. During the process was possible to experience, as in a real life project, how to apply and reach the desired results of a theoretical research method.

It was clear how important are the members involved in the research during the different stages of the design process, especially in the ideation, prototyping and evaluation.

## 4.1. TEMPORALITY

The most important result of the project was the exploration of the concept of temporality (Huang & Stolterman, 2011) in relation with the communication and interactions held by Students and Teachers (See Figure 7). It was crucial to understand the design problem and conceive an appropriate solution. Thus, Temporality defines a notable paradigm enabling the identification of users behaviors and the tools used by them with respect a specific application. (Lundgren & Hultberg, 2009). In other words, with this vision we were able to identify a specific tool for a specific momentum and their strengths and weakness. For instance, the program’s website responds for a long-term action because of the relation that exist between the information is posted and the time the student takes to check it.

To conclude, temporality thought in terms of communication, is basically the relation that exist between the times a teacher post a message and the time students receive that and reply. So, based on that concept the project was centered on the exploration of the shortest temporality scale “the minutes” (see figure 7). Defined this, the testing process was initiated.

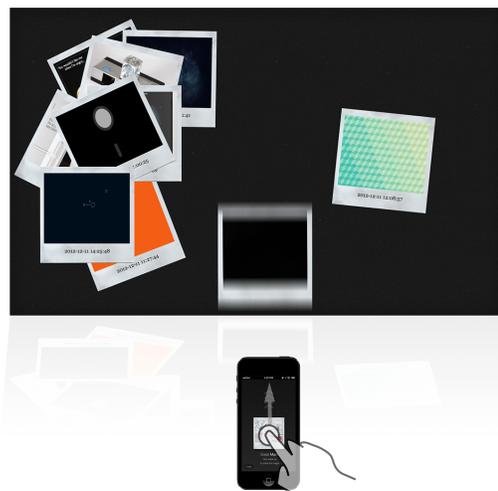


Figure 5 – Swiping images from mobile to presentation

## 4.2. DESIGN RATIONALE

The application is a concept that combines different notions of interaction, creating a novel way to develop a typical lecture that requires the participation and contributions of students based on the participatory design methods. With a design that aims to encourage students to put their attention in the design process and the collaboration with others instead to be distracted by other sources like social networks or messaging systems and looking for a quick response of the student into the classroom.

The first stage of the application was intended to be use only for the students that were participating in the design process. Due to this, the interface just required a simple method to access the files into the mobile device and a simplified GUI based in two steps, choose file and upload it. Then, if the user was satisfied with the file chosen, he only needs to do a swiping gesture to upload the file directly to the board. This effect creates the illusion of floating the file from one device to presentation board.



Figure 6 – Screenshot of arranged group of Polaroids (More Images in <http://goo.gl/kSX86>)

The second interface, the presentation layer, is a board where the teacher has the control of the images sent and presented there. The idea is to have the contributions of the students not only by adding the content but also inspiring debates, discussion and collaboration among the students and extending the lecture in a more interactive way. So, when the teacher is in the second interface. He can ask to the student to make their contributions with content related with the lecture given. Thereby, as soon as all the students present in the lecture upload and swipe the images into the system, these images appears in the teacher's screen (Obviously the teacher's screen should be shared through a projector to make these images visible for everyone). After that, students are encouraged to discuss about the content and with the help of the teacher the images could be move and arranged in groups to create collections for inspiration of the participatory design process. Finally, the teacher can make a screen capture of the final arrangement and send it to the students for future reference and also could be used as a log of the design session.

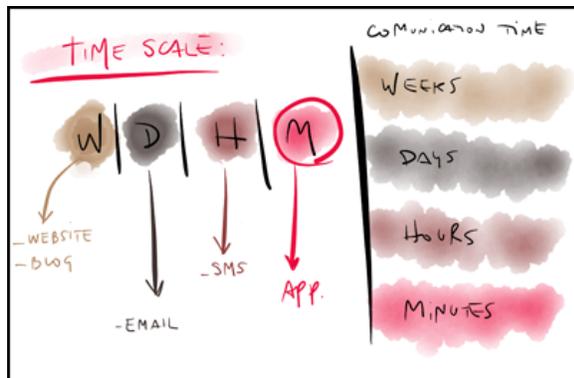


Figure 7 – Time Scales and temporality

## 5. CONCLUSION

The intention with this approach was to explore a new way to drive interaction among students and teachers in the classroom. Due to the excess of external distractors (Coughlan et al., 2011) it was necessary comes with a novel approach to encourage teachers and students work together instead of the typical magisterial lecture. The methods proposed in Participatory Design were and incredible source of inspiration and development in the whole project.

The tool proposed in this paper allows teachers to create an interactive environment in the short time scale motivating participation within the student group which have an enormous

potential specially to integrate external contributors into the classroom.

Our vision is to create a dynamic class where every single idea or thought is valuable and it could be shared.

We believe that more dynamic environments are crucial during the analysis and creative stage of any interaction design process and it is essential in the classroom in order to share knowledge faster. Interaction students come from different backgrounds so the input that they can give to a project is very diverse and potentially useful. Our demo of a sharing content application proved, during class, to be an useful application to enhance student environments by giving them the opportunity to explore a new ways of interaction at class.

Finally, the inclusion of this kind of tools can create a new generation of participatory design environment for the creation of highly complex concepts with the help of enormous groups of students and designers around the globe.

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